In-Use Off-road Diesel Vehicle Rule Workshop

February 20, 23, 26, and March 1, 2007
San Diego, Fresno, Sacramento, and Riverside

Heavy-Duty Diesel In-Use Strategies Branch

California Environmental Protection Agency

Air Resources Board

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Overview

- Need for emissions reductions
- Proposed rule
- Changes since December 2006 proposal
- Fleet examples
- Fleet financial impact analysis
- Revised benefit and cost estimates
- Outreach and next steps

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Need for Emission Reductions

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Need for Emission Reductions

- Must reduce Diesel Particulate Matter (PM) to reduce deaths from cancer, heart disease, etc.
  - Diesel PM responsible for 70% of known cancer risk from all air toxics
  - Thousands of deaths per year in California
- Must reduce oxides of nitrogen (NOx)
  - NOx leads to ozone and secondary PM
- Federal law dictates that the state must attain ozone and PM standards by certain deadlines

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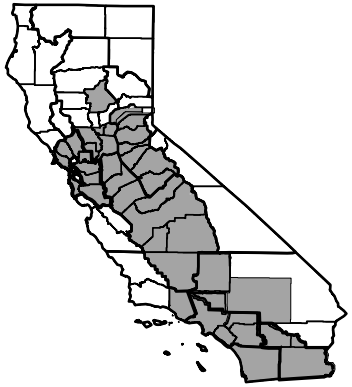
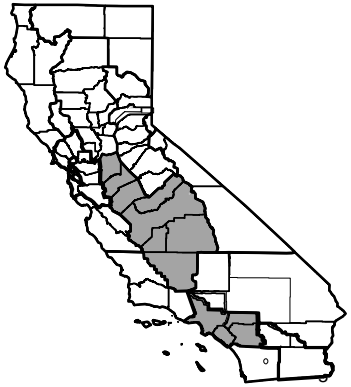
Nonattainment Areas

8-hr Ozone Annual



PM 2.5 Annual



Proposed In-Use Off-road Diesel Vehicle Rule

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Rule Scope

- Commercial off-road diesel vehicles
  - 25 horsepower and greater
- Construction, industrial, mining, airport ground support, and other vehicles
- Does not apply to on-road vehicles
  - Are or could be registered and driven safely on-road
- Does not apply to vehicles used primarily for agricultural operations
  - To point of first processing
  - Including forestry

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Rule Overview

- **Meet Best Available Control Technology (BACT) requirements**
  - NOx - Turn over engines
    (10% of hp per year)
  - PM - Apply PM retrofits (called VDECS)
    (20% of hp per year)

  or
- **Meet NOx and PM average targets**
  - Fleet average targets decline over time

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Rule Overview (Continued)

- Annual reporting begins in 2008
- Idling limits begin in 2008
- Only cleaner vehicles may be added to fleets beginning in 2008
- Requirements vary by fleet size

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Rule Overview (Continued)

Fleet Size Category	Description	Compliance Dates
Small	<=1,500 hp & small business or municipality or low population county municipality fleet	2015-2025 PM-only
Medium*	20,000 hp or less and not small California State and US government	2010-2020 PM and NOx
Large*	> 20,000 hp, privately owned	2009-2020 PM and NOx

* Same requirements for large and medium fleets, only compliance dates vary.

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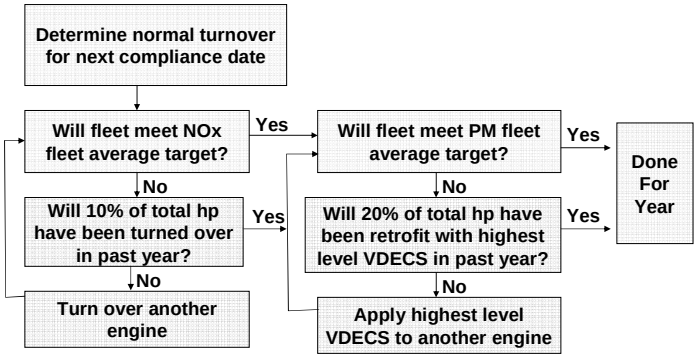
Annual Compliance Process

Large and Medium Fleets



Note: Turn over means repower with cleaner engine, replace vehicle with used vehicle or new vehicle, designate as low-use, or decrease fleet size.

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Exemptions from Engine Turnover Requirements

- Small fleets
- Vehicles less than 10 years old
- Specialty vehicles if certain criteria are met
- Vehicles retrofit with best available VDECS in past 6 years
- Tier 4 and interim Tier 4 engines
  - Available 2008 to 2011 and later, depending on hp

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Exemptions from Retrofit Requirements

- Engines in vehicles less than 5 years old
- Engines for which there is no retrofit available or cannot be safely installed
- New engines that come with a diesel particulate filter
- Engines already retrofit with the best available control at time of installation
  - Level 2 or 3

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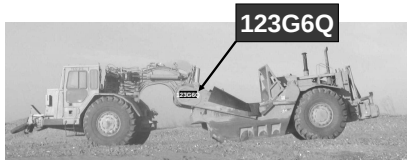
Vehicle Labeling

- All vehicles must be labeled
  - ARB assigns vehicle number after initial reporting
  - Fleets must label vehicles within 30 days
- Number stays with vehicle over its lifetime
- Permanently affix or paint on left side of vehicle ~5 feet above ground



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Special Provisions for Attainment Counties

- Fleets captive to attainment areas
  - Do not need to meet turnover requirements or NOx fleet averages

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Special Provisions for Low-Population Counties

- Municipality fleets in low-population counties are treated as small fleets

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Exemptions and Compliance Extensions

- Exempt from all but recordkeeping/reporting
  - Low-use vehicles
    - Operated less than 100 hours/year
  - Emergency vehicles
  - Dedicated snow removal vehicles
- Compliance extensions
  - Manufacturer delays for retrofits or new engines
  - Delay of Tier 4 interim or final vehicles

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Enforcement

- Reporting
  - Initial reporting in 2008
  - Subsequent annual reporting
- Labeling
  - Label with equipment identification number (EIN)
  - EIN allows look-up of model year and control strategy for each engine in each vehicle
- Inspection
  - Fleet audits
  - Facility and construction project inspections
  - Roadside inspections
- ARB requesting additional enforcement staff

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Incentive Funding

- Funding criteria will assume all fleets are on BACT path
- Small fleets
  - Always eligible for grants based only on NOx and ROG reductions
  - Eligible for PM retrofit projects completed by February 28, 2012
- Fleets exempt from NOx requirements
  - Always eligible for grants based only on NOx and ROG reductions
- Large and medium fleets
  - Large applicant buy-in needed to receive funding

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Changes to December 2006 Proposed Regulatory Language

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Recent Changes
Exemptions and Flexibility

- Exemptions:
  - Vehicles used for noncommercial purposes
  - Dedicated snow removal vehicles
  - Captive attainment area fleets exempt from the NOx fleet averages
  - Tier 1 and higher vehicles exempt from turnover until 2013
- Flexibility:
  - No 2012-2014 fleet average requirements for small fleets
  - Low-use exemption no longer sunsets
  - Sales disclosure only for sales within California

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Recent Changes
New Requirements

- Do not add Tier 0 vehicles unless already meet the fleet average targets
- Exhaust retrofits at end of phase in period
  - Excludes Tier 4 and low-use vehicles
- Additional reporting requirements for fleets that bring vehicles in and out of CA and claim them as low-use

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Recent Changes
Refinements and Definitions

- Carryover retrofit credit and carryover turnover credit
  - Credit for fleets that turn over > 10% or retrofit > 20% in a year
- Executive Officer may issue a delay for a fleet or group of fleets if:
  - Tier 4 interim or final vehicles are delayed
  - No VDECS can be installed safely
- Refined definitions
  - Agricultural operations (forest operations)
  - Redefined California and federal public fleets as medium fleets
  - Maximum power references SAE Method J1349
  - VDECS failure

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Fleet Examples

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What Rule Will Mean for Fleets

- Newest vehicle fleets
  - No significant impact
- Oldest fleets (large/medium)
  - Accelerate turnover of engines to 10%/yr starting 2008-2009
  - Exhaust retrofit 20%/year starting 2008-2009
  - Possibly turn over oldest engines once exhaust retrofits are older than 6 years
- Typical small fleet
  - Some exhaust retrofits starting 2014
- Oldest small fleets
  - 20%/year exhaust retrofits starting 2014

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Compliance for an Example Small Fleet

Vehicle Type	Model Year	Emission Tier	Horsepower	Exhaust Retrofit
Paver	1989	Tier 0	84	2015
Dozer	2000	Tier 1	75	2017
Loader	1986	Tier 0	50	2023
Skid Steer	2004	Tier 2	115	2019

Fleet Average (g/bhp-hr)	NOx	PM
Baseline	8.0	0.77
Ending	8.0	0.12

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Compliance for an Example Medium Fleet

Vehicle Type	Model Year	Beginning Tier	Horse-power	Turn over to 5 yr old	New Model Year	Ending Tier	Exhaust Retrofit
Paver	2006	Tier 3	240				2011
Backhoe	2005	Tier 2	98	2020	2015	Tier 4	2010
Loader	2004	Tier 2	73	2020	2015	Tier 4	2010
Roller	2003	Tier 1	46	2018	2013	Tier 4	
Paver	2001	Tier 1	34				2021
Paver	1995	Tier 0	125	2019	2014	Tier 4I	2012*
Other	1999	Tier 1	34	2017	2012	Tier 4I	
Loader	1990	Tier 0	60	2015	2010	Tier 4I	
Grader	1988	Tier 0	158	2016	2011	Tier 3	2018
Paver	1984	Tier 0	70	2014	2009	Tier 4I	
Roller	1989	Tier 0	78	2013	2008	Tier 3	2020
Paver	1983	Tier 0	163	2013	2008	Tier 3	2020
Loader	1985	Tier 0	130	2012	2007	Tier 3	2012
Other	1986	Tier 0	175	2011, 2018	2006,2013	T3, T4I	2011, NA
Surfacing Equip	1977	Tier 0	106	2012	2007	Tier 3	2012
Roller	1979	Tier 0	78	2010	2005	Tier 2	2010
Roller	1962	Tier 0	115	2010	2005	Tier 2	2010

Fleet Average (g/bhp-hr)	NOx	PM
Baseline	9.8	0.67
Ending	2.8	0.05

* PM Retrofit on Tier 0 for 7 years then replaced with Tier 4

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How long will my Tier 2 or Tier 3 vehicle be "compliant"?

- Rule is a fleet average rule, so no such thing as an individual vehicle being "compliant"
  - Each vehicle moves fleet closer or further from targets
- No turnover required for vehicles < 10 years old
- No retrofits required for vehicles < 5 years old

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Emission Benefits and Cost and Fleet Financial Analysis

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Magnitude of Costs

- Examined data
  - Fleet and financial data for volunteer fleets
  - Typical industry profits from Construction Financial Management Association survey
- Construction fleet profits typically 2-7% of revenues
- Small increases in revenue (0.1% to 4%) adequate to cover costs of compliance

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Example Small Fleet Financial Impacts

Cash flow ($/yr)	Fleet A	Fleet B	Fleet C
Gross revenue before taxes	$100,000	$275,000	$175,000
Net profit (if 7%)*	$7,000	$19,250	$12,250
Revenue increase needed	$4,000 4%	$6,400 2%	$4,000 2%

*Average profits assumed = 7% of revenue (CFMA 2006 survey, Specialty Trade Contractors, West)
Tax rate assumed = 21%

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Example Medium/Large Fleet Financial Impacts

Cash flow ($/yr)	Medium Fleets			Large Fleet
	Fleet A	Fleet B	Fleet C	
Gross revenue pre-tax	$7,514,000	$3,802,000	$77,500,000	$41,000,000
Net profit after tax	$75,551	$182,215	$1,175,000	$822,000
Revenue increase needed	$22,200 0.30%	$66,250 1.70%	$99,900 0.10%	$1,428,200 3.50%

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Emission Benefits of Regulation

•Emission benefits associated with thousands fewer premature deaths over course of rule

NOx Emissions	2010	2015	2020
Without Rule (tpd)	325	240	162
Benefits Rule (tpd)	17	36	37
% Reduction	5%	15%	23%

PM Emissions	2010	2015	2020
Without Rule (tpd)	18.5	12.6	7.5
Benefits (tpd)	5.5	7.4	5.6
% Reduction	30%	59%	75%

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Statewide Cost/Benefits Analysis

- Evaluated costs and benefits for variety of fleets
  - Varying fleet age, size and equipment distribution
  - Varying purchase strategies
- Rule will affect different fleets differently
- Since December workshops, evaluated more sample fleets to refine estimates
  - 16 additional fleets with 6000 vehicles
- Staff running sensitivity analyses, refinements:
  - Post-2020 benefits
  - Change in vehicle value due to rule
  - Various compliance strategies

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Cost/Benefits of Regulation

- Cost of regulation ranges from $2.7 to 3.3 billion
- Anticipated increase of 0.5% per year in statewide construction costs
- Revised cost effectiveness
  - $27/lb PM
  - $5.6/lb NOx
  - Attributes half of cost towards NOx and half towards PM benefits


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Outreach, Next Steps and Contacts


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Outreach Efforts to Continue

- Public workshops & workgroup meetings since November 2004
- Regular notices to email lists
- Mailing regarding rule development
  - 79,000+ licensed contractors
  - 4,000+ mining, solid waste, & recycling facilities
- Calls/letters to industry associations
- Equipment dealers and fuel sellers are mailing flyer to customers
- Recent mailing to > 290,000 contractors

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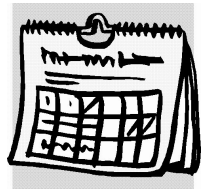
Next Steps

- Now thru May 2007
  - Continue outreach and meetings with stakeholders
- February-March 2007
  - Last set of workshops
- April 6, 2007
  - Staff report release
- May 25, 2007
  - Consideration by Board



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Off-Road Regulation - www.arb.ca.gov/msprog/ordiesel/ordiesel.htm

Verified Devices - www.arb.ca.gov/diesel/ verdev/verdev.htm

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